Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

- Ozone in Odor Control, P.5
- Canada's Fresh-water Fisheries, P.7
- New Form of Vitamin D, P.9
- Glazing Brine-frozen Salmon, P.15
- New Filleting Machine, P.19

—and 35 others

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JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0 General and theoretical
1 Fish by species
2 Fresh fish
3 Preserved fish
4 Oils
5 Vitamins
6 Fishery by-products
7 Analytical Methods
8 Composition
9 Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1950

4.90 NUTRITION RESEARCH TALKS GIVEN AT FISHERIES INSTITUTE CONVENTION

Anonymous
Feedstuffs 25, No. 17, 10-11, 14, 70 (April 25, 1953)

According to Hugo W. Nilson of the U. S. Fish and Wildlife Service, considerable interest has arisen over the possibility of adding animal or vegetable oils and fats to poultry and swine feeds. Part of this interest has been due to the relatively large quantities of oils and fats available and to the possibility of improving the texture of feeds that are dry and dusty.

In group feeding experiments conducted at the Fishery Technological Laboratory at College Park, Maryland, centrifuged menhaden oil, settling menhaden oil, or corn oil was fed to broilers at 0, 2, 4, 6, or 8 percent levels as an addition to a basal diet. Other broilers received 0, 6, and 8 percent centrifuged menhaden oil, 2 mg. of niacin, 5 mg. of alpha-tocopherol per pound of feed, and 2 1/2 percent of dried brewers' yeast as a replacement for an equal weight of ground yellow corn. The pounds of feed consumed per pound of gain for all groups ranged between 2.4 and 3.1. The control group, which received no oil whatsoever, required the most feed per pound of gain -- 2.5 pounds at 7 weeks and 3.1 pounds at 12 weeks of age. Otherwise there probably were no significant differences between the groups except that the group receiving 8 percent settling menhaden oil was somewhat lower in individual weights, apparently due to eating less feed.

From the live chicken viewpoint, fish body oils fed in levels not exceeding 8 percent produced good results. When these chickens were cooked for eating, however, the results were not so promising. Even the chickens that had received only 2 percent centrifuged or

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 ABSTRACTER: Martin Heerdt

4.21 OXIDATION OF OILS AND FATS

Bawn, C. E. H.
Nature 171, No. 4363, 1057-1059 (June 13, 1953)

The article consists of a summary of four papers presented at a symposium on "Oxidation" by the Oils and Fats Group of the Society of Chemical Industry in the Low Temperature Research Station, Cambridge, England.

In the paper presented by Dr. C. H. Lea, he stated that the degradation products of the primarily-formed hydroperoxide, particularly $\alpha\beta$ unsaturated aldehydes and ketones, are largely responsible for the unpleasant odor and flavor of oxidized fats. Due to rapid autoxidation, the presence of even small proportions of poly-unsaturated acids not only increases the susceptibility of the whole fat to oxidation, but seems to be responsible for the characteristic "off" flavor. Traces of copper and iron promote the development of these flavors in fats. Dr. Lea discussed the role of enzymatic catalysts -- the lipoxidases -- in the peroxidation of unsaturated fats and fatty acids. It has been reported in recent literature that peroxidized fat may be present in the tissues of living animals that have been exposed to ionizing radiation. Radiation initiates oxidative reactions resulting in the development of "off" flavors in foodstuffs.

Dr. Banks, the second speaker, stated that the product of the autoxidation of linoleic acid is a mixture of peroxides; after reduction and separation by partition between petrol ether and aqueous methanol, two types of linoleic esters (hydroxy acids) are isolated. In the autoxidation of methyl linoleate in the presence of lauric and palmitic acids at 35° and 55°C., esterification does not occur; this indicates that esters isolated are formed when the peroxides are being reduced.

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 ABSTRACTER: D. T. Miyauchi

3,230 FROZEN SEAFOOD ITEMS SPOTLIGHTED AT SHOW

Anonymous
Food Engineering 25, No. 6, 186 (June,1953)

The many seafood items displayed at the recent Frozen Food Industries Exposition in New York City indicate that the popularity of specialty seafoods is increasing. Items pictured in the article include french fried shrimp and baked stuffed lobster, which are only two of a complete line of frozen seafoods being offered by a Boston company. The fried shrimp are of uniform size, packed in 7-ounce, waxed, chipboard cartons, labeled with a colored insert, and overwrapped in cellophane. The baked stuffed lobster is prepared from Maine or Canadian chicken-type lobsters weighing approximately 1 pound when captured and not less than 8 ounces after processing. Meat that is removed from the claws is used in the stuffing. Both of the above items are precooked for serving immediately after heating.

Another item being marketed is a frozen New England clam chowder that is presently appearing in a cylindrical carton especially designed for the product. The chowder, along with other of the company's frozen seafoods, is being distributed by a New York firm.

Frozen salmon croquettes packed four to an 8-ounce, waxed, chipboard box with insert label and cellophane overwrap have been added to a popular line of frozen food products presently being packed in Brooklyn, New York. The remaining item displayed at the Exposition was a carton containing 5 or 6 small, tender, quick-frozen, lobster tails processed and packaged in Havana, Cuba for the special delicacy trade.

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 ABSTRACTER: Martin Heerdt

3.239 CONTRIBUTION TO THE STUDY OF THE CONTRACTURE CAUSED BY THAWING

Crepax, P. and Herion, A.
Biochim. Biophys. Acta 6, 54-65 (1950)

The "contracture" caused by thawing a frozen muscle does not of itself produce the changes in solubility of muscle proteins which characterize contracted muscle. These changes occur about 2 hours after the onset of contracture, and they may be due to rigor mortis accelerated by the freezing of the tissue. In normal muscle, the contracture on thawing only occurs when sufficient adenosinetriphosphate is present; it involves a rapid and complete hydrolysis of this substance, which thus cannot be involved in the changes in solubility which occur subsequently in the myosins of the muscle. In muscle poisoned with monobromoacetate, thawing does not produce contracture, whatever the concentration of adenosinetriphosphate present. The relation of these facts to present knowledge of the actin-myosin combination is discussed.

 (The above abstract appears in Food Science Abstracts 25, No. 2, 131, March, 1953 and is reprinted here)

FISH OILS IN POULTRY FEEDS

FROZEN SEAFOOD SPECIALTIES

OXIDATION OF OILS AND FATS

STUDY OF CONTRACTURE CAUSED BY THAWING

3.230

4.90

settling menhaden oil had a fishy-flavored meat. Feeding experiments are now in progress in which levels of 0, 1/2, 1, 1-1/2 and 2 percent centrifuged menhaden oil are being fed to determine a safe level for broiler feeding.

Fish oil selling for as little as 6 cents a pound could be used profitably as an addition to high energy broiler feeds to increase their calorific value, according to David Miller of Maine Marine Products, Inc. To determine the effect of feeding oils to broilers, herring oil (containing 1.6 percent free fatty acid) was fed at a 2-1/2 and a 5 percent level and fatty acids obtained from the hydrolysis of fish oil were fed at a 1 percent level in broiler rations. The chicks receiving these rations were raised in a battery on wire screen floors.

The results of the foregoing feeding studies may be summarized as follows:

1. Fatty acids can be fed at the 1 percent level without harm.
2. Chicks on the 5 percent level of herring oil showed a slight bleaching of shank pigmentation, whereas those on the 2-1/2 percent level did not show any pigmentation change.
3. There was no apparent trend of improved feed efficiency proportionate to the level of herring oil added.
4. Dustiness of the feed was minimized by the addition of the oils.
5. The palatability of the feed did not appear to be affected.

4.21

Dr. Skellon presented a review of recent work on the oxidation of monoethenoid fatty acids and their higher esters catalyzed by metallic soaps.

Dr. L. A. O'Neil presented evidence "that one of the polymer-forming reactions in the autoxidation of non-conjugated drying oils results from the metallic salt-catalyzed decomposition of the initially formed hydroperoxide." Studies of the autoxidation of drying oils in film form showed that linseed oil takes up 8 atoms of oxygen per molecule, but only 5 atoms are retained after 14 days. The other oxygen atoms are lost as volatile products, such as water, carbon dioxide, aldehydes, and acids. "Little change occurs in the film after a few days, and it seems necessary to postulate scission of the oxidation polymer in order to explain this high oxygen take-up."

0.7

INTERPRETATION OF AMINO ACID REQUIREMENT DATA ACCORDING TO THE LAW OF DIMINISHING RETURNS

Almquist, H. J. (The Grange Company, Modesto, California)
Archives of Biochemistry and Biophysics 44, No. 1, 245-247 (May, 1953)

Application of the Law of Diminishing Returns to the interpretation of vitamin A and carotene requirement data has been discussed by Almquist (1952, 1953). This law applies closely except when physiological limits of response to nutrient variations are attained, or at very low levels of specific nutrient intake where reserve stores or synthesis in the animal or small residual quantities in the diet may be important fractions of the supply to the animal.

In Fig. 1 (over) are illustrated several examples of the application of this principle to amino acid requirement data by the use of logarithms. Chart A was constructed from data of Almquist and Merritt (1950) based on the arginine requirements of young chickens as affected by protein level at 15, 20, and 30 percent protein in the diet. Daily rate of gain was plotted as the ordinate against the logarithm of the total arginine contents of the diets. Noteworthy is the evident linear relation of rate of growth to the logarithm of the total arginine level in the diet, over all protein levels. The relation reaches a plateau of growth in each case as the protein level of the diet becomes the limiting factor. This fact shows that a deficiency of arginine gives the same net results as a deficiency of protein.

In Chart B, data of Saxena and McGinnis (1952) have been calculated to express the gain-feed ratio of broilers (ordinate) in relation to the logarithm of total methionine level in each of three diets. In these cases, not enough methionine was added to establish a growth plateau. Chart C was constructed from data of Jukes and Stokstad (1951) and shows the effect on chick weight (ordinate) of varying methionine levels plotted as logarithms, in diets with and without a vitamin B_{12} supplement. In each case the logarithm of the optimal methionine level at the growth plateau point was equivalent to 0.6 percent methionine in the presence of 0.22 percent cystine. Chart D was constructed from data of Briggs

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 Reprinted in part

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THE ELECTRODIALYTIC REMOVAL OF INORGANIC MATERIAL FROM ORGANIC MARINE PRODUCTS

Dunbar, J. C. and Mitchell, T. J.
Journal of the Science of Food and Agriculture 4, No. 4, 183-190 (April, 1953)

Studies were made to determine the efficiency of electrodialysis for removing inorganic constituents from the seaweed Laminaria cloustoni and from fish albumen.

The samples of seaweed were separated into stipes and fronds. Each sample was dried and ground to pass a 1.6 mm. screen. The electrodialysis cell used in the experiments was divided into three sections which were separated by ceramic plate diaphragms. The sample, mixed with distilled water, was placed in the center section of the cell. The end sections containing the carbon electrodes were filled with distilled water. When a potential was applied to the cell, alkaline ions passed into the cathode section and acid ions migrated to the anode section. At the completion of the dialysis the contents of the cathode section were acidified with hydrochloric acid and then were evaporated to dryness. No magnesium or calcium ions were found in the residue. The contents of the anode section were analyzed qualitatively and chloride and sulfate ions were found present.

The best separation of inorganic constituents was obtained by applying a high potential to break down the initial resistance within the cell. This reduced the time required to obtain satisfactory separations. The total ash content of the stipes was reduced from 33.4 percent to 7.4 percent in 30 minutes while the ash content of the fronds was reduced only from 28 percent to 22.8 percent in the same time.

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 ABSTRACTER: W. N. Sumerwell

0.38

BIOSYNTHESIS AND ENERGY TRANSPORT BY ENZYMIC REDUCTION OF "ONIUM" SALTS

Woolley, D. W. (Rockefeller Institute of Medical Research, New York)
Nature 171, No. 4347, 323-328 (February 21, 1953)

Existing evidence indicates that the synthesis of a variety of chemical constituents of living matter, as well as the controlled transfer of energy in processes of life occur through the functioning of energy-rich phosphate esters and anhydrides. However, it appears that some reactions are not driven directly by the energy contained in phosphate compounds but instead derive the necessary energy from the reduction of quaternary ammonium ions or sulphonium ions.

An example of such a reaction is the cleavage of thiamine by the enzyme thiaminase which is prevalent in carp tissue. In this reaction the liberation of the thiazole portion of the thiamine molecule proceeds with a reduction in the valence of the thiazole nitrogen from 5 to 3. The pyrimidine half of thiamine is combined with an acceptor amine to form a new molecule. Thus the action of thiaminase on thiamine results in the synthesis of a substituted amine. Various acceptor amines can be used. It was first shown that meta-nitroaniline or meta-aminobenzoic acid could take part in the reaction. Later it was found that pteroylglutamic acid could be synthesized by the action of thiaminase on the pteridine analogue of thiamine in the presence of p-aminobenzoylglutamic acid.

It also has been demonstrated that pyridine can act as an acceptor amine in the thiaminase reaction.

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 ABSTRACTER: W. N. Sumerwell

0.34

PIGMENTS FROM A MARINE "RED WATER" POPULATION OF THE DINOFLAGELLATE PROROCENTRUM MICANS

Pinckard, J. H.; Kittredge, J. S.; Fox, D. L.; Haxo, F. T.; and Zechmeister, L. (California Institute of Technology, Pasadena and Scripps Institution of Oceanography, La Jolla)
Archives of Biochemistry and Biophysics 44, No. 1, 189-199 (May, 1953)

Red water along the Pacific Coast in the waters off Southern California during July 1952 provided an opportunity for an examination of marine pigment extracts. The particular sample from which plankton was recovered for pigment analysis was obtained from the sea surface at La Jolla and a few miles off shore. Extracts of what turned out to be a practically pure sample of the dinoflagellate Prorocentrum micans were subjected to chromatographic analysis.

The main carotenoid was identified as peridinin. Minor carotenoids present belonged chiefly to the xanthophyll type. Carotenes were found in small quantities. Phytofluene and a similar fluorescent, colorless polyene were absent, although other fluorescent compounds were found. Preserved extracts yielded pheophytin a in place of the corresponding chlorophyll. The presence of chlorophyll a was demonstrated, however, in freshly heat-killed cells.

 ABSTRACTER: Martin Heerdt

AMINO ACID REQUIREMENT

ENZYMIC REDUCTION OF "ONIUM" SALTS

ELECTRODIALYSIS OF SUSPENSIONS

PIGMENTS FROM MARINE "RED WATER"

0.38 (Cross Reference: 5.2)

One other reaction involving cleavage at a quaternary link is that of the enzyme "diphosphopyridine nucleotidase" which destroys diphosphopyridine nucleotide. In this reaction water takes the place of the acceptor amine.

It is suggested that the energy used to drive these reactions is produced by the reduction of the quaternary nitrogen.

0.7

et al. (1942) and of Grau and Kamei (1950) (left ordinate) to show the effect of cystine added to White Leghorn chick diets containing 0.5 percent methionine and approximately 20 percent protein. In each case the weight gains reached a plateau at approximately the logarithm of 0.4 percent cystine.

Chart E presents data from Alexander and Hill (1952) concerning the effect of heat on the lysine content of sunflower seed meal. The logarithm of the total lysine remaining in the diet shows a close linear relation to chick growth (ordinate) which reaches a plateau at a value equivalent to 0.9 percent lysine in the diet.

Chart F represents the effect of total dietary methionine on the gain-feed ratio of swine (ordinate) as calculated from the data of Curtin et al (1952). While the pigs grew at different efficiencies in the two experiments, plotting the results indicates that the logarithm of the methionine requirement was in each case equivalent to 0.45 percent methionine in the diet in the presence of 0.26 percent cystine. Similar analysis of data by Shelton et al. (1951) indicates a methionine requirement of 0.38 percent in the presence of 0.31 percent cystine; hence these reports are in close agreement in respect to total sulfur amino acid requirement of young pigs.

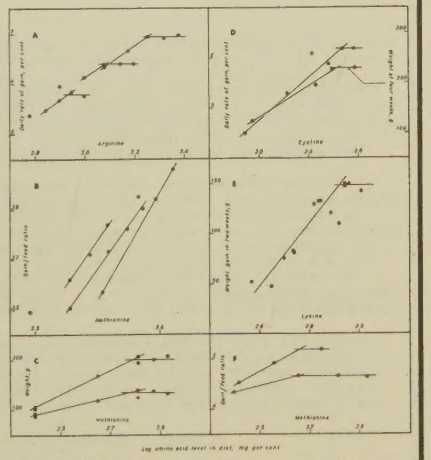

FIG. 1. Application of Law of Diminishing Returns to amino acid requirement data.

0.30 (Cross References: 6.3, 0.32)

In the experiments with fish albumen, a three-compartment cell with cellulose diaphragms was used. The solutions were made by mixing 4 g. of fish albumen with 100 ml. of water. The ash content of the fish albumen was reduced from 7.7 percent to 4.0 percent in 90 minutes.

The fact that the removal of inorganic substances is not complete is attributed to organically bound and insoluble mineral compounds such as calcium alginate and calcium citrate.

6.3 THROUGH-CIRCULATION DRYING OF SEAWEED

Gardner, R. G. and Mitchell, T. J.
Journal of the Science of Food and Agriculture 4, No. 3, 113 (March, 1953) and No. 5, 237 (May, 1953)

I. Laminaria cloustoni stipe

The drying characteristics of freshly harvested seaweed stipe of the species Laminaria cloustoni have been investigated in a laboratory through-circulation drier. The stipes, with a water content of 83-86%, were cut on a bacon slicer into discs 1/8-in. thick by 1-1 1/4-in. in diameter.

Experiments on the effect of interruption of drying, initial water content, and repeatability established the experimental procedure before studying the principal factors. Variables studied were bed depth (0.5-7 in.), air temperature (120-340°F.), air wet-bulk depression (44-228°F.) and air velocity (3-9.5 lb./(sq. ft.)(min.)), slice thickness (1/16 to 5/16 in.) with an experiment on agitation. Static pressure drops of air passing through beds of dried and wet stipe slices were also investigated.

As the initial drying rates of the seaweed beds were virtually constant, the value of this constant rate has been correlated with the drying factors. Drying times between water content limits of 5 to 0.15 lb. of water/lb. of bone-dry solids have been related by empirical equations to the drying conditions.

It has been demonstrated that the drying rates of seaweed beds at average water contents of 5 to 0.2 lb./lb. of bone-dry solids are directly proportional to the wet-bulb depression of the air, and a unit wet-bulb depression evaporation coefficient may be used to find approximate drying times and rates.

Tests showed that static beds of seaweed stipe were scorched at temperatures of 250°F. or higher.

Factors to be considered in the design of a continuous through-circulation drier for stipe are given.

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Author's abstract

6.135 ODOUR CONTROL WITH ULTRA-VIOLET RADIATION

Summer, W.
Food Manufacture 28, No. 6, 230-235 (June, 1953)

Ultraviolet deodorization of air is a physical method of using the oxygen of the air to produce ozone for interacting with odors at their source. The process of generating ozone can be shown simply as $3\ O_2 + h\nu \rightarrow 6\ O \rightarrow 2\ O_3$ where $h\nu$ is the quantum energy of ultraviolet radiation of between 1,849 Å. and 1,952 Å. wavelength. The oxygen molecule that has been split into two atoms tends to reunite in the form of a 3-atom molecule known as ozone. Ozone is a very active oxidizing agent with a relatively long life in comparison with that of nascent oxygen, which lasts about one microsecond. Both nascent oxygen and ozone are truly destructive agents in that they change the chemical structure of molecules so that they no longer stimulate human osmoceptors.

The three ways of producing ozone in air are: (1) a chemical reaction method, (2) the silent electric discharge method, which is an approach to ozonization, and (3) the ultraviolet irradiation method using a mercury vapor discharge tube made from pure fused quartz transmitting well in the ozonogenic region of from 1,849 to 1,952 Å. The latter method is the most satisfactory and yields unfailing results. Ozone has a slight odor of its own; therefore, a balance must be kept between the ozone produced and the ozone used, to prevent this odor from becoming apparent.

Two general methods for controlling odors with mercury vapor units are being used at present. The first of these is a room unit for direct control at the source; the second is a chamber unit for controlling offensive odors prior to discharge into the open air. The room unit consists of a standard (12-inch discharge length) quartz mercury vapor discharge tube backed by an aluminum reflector and mounted on top of a square box containing the electrical control gear. When the mercury vapor units are used in conjunction with

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 ABSTRACTER: Martin Heerdt

6.139 RELATION OF DRYING METHOD TO MEAL QUALITY

Klungsoyr, M.; Boge, G.; and Sparre, T.
Meldinger fra SSF, No. 2, 22-30 (March, 1953)(In Norwegian with English summary)

Part II -- Vitamins in ordinary meals

The influences of the type of dryer and the temperature of drying upon the destruction of the B-vitamins in herring presscake were studied. The drying methods used in the preparation of meals were as follows:

1. Flame drying using air temperatures varying between 700-785°C. at the inlet and 110-122°C. at the outlet.
2. Flame drying using air temperatures varying between 700-720°C. at the inlet and 75-78°C. at the outlet.
3. Flame drying using air temperatures varying between 400-410°C. at the inlet and 81-84°C. at the outlet.
4. Air drying using temperatures varying between 230-130°C. at the inlet and 50°C. or lower at the outlet.
5. Steam drying.

The finished meals were analyzed for riboflavin, vitamin B_{12}, and pantothenic acid, the results of which are shown in table III (this card, over).

Riboflavin, vitamin B_{12}, and pantothenic acid were not subject to destruction as a result of drying by methods 2, 3, or 5 (outlet temperatures below 100°C. and moisture content of the meals at about 10 percent). Destruction of the foregoing B-vitamins did occur, however, in a small degree from drying by method 4 (with a large excess of air) and to a larger degree from drying by method 1 (with an air outlet temperature above 100°C.).

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 ABSTRACTER: Martin Heerdt

6.190 THE ATTITUDE OF FEED NUTRITIONISTS AND AGRICULTURE RESEARCH WORKERS TOWARD FISHERY FEED PRODUCTS

Holder, Ralph C. (National Fisheries Institute, Washington, D. C.)
National Fisheries Institute Yearbook for 1953, p. 91

Inasmuch as it is advisable for any business to evaluate periodically the progress it has made, the author gives a review of the developments of the past decade, including the current situation.

At the outbreak of World War II, there was a sharp increase in the demand for balanced rations, and the manufacturers of fish meal found a ready market for all they could produce.

During 1942 and 1943, there was considerable interest in condensed fish solubles. By 1944, the feed nutritionists had found that the solubles have outstanding value for correcting the deficiencies of the common rations for poultry and swine. As a result, large quantities of the condensed solubles were purchased for use in commercial feeds.

Shortly after the close of World War II, workers at the Connecticut Agricultural Experiment Station recommended a high-energy broiler feed. Inasmuch as this ration required 8 percent fish meal, the recommendation greatly increased the demand for the meal. With only 200,000 tons being produced in this country annually, the meal became scarce. In March 1949, it reached a price of $275 per ton.

The relatively high price of the meal stimulated a search for substitutes. The residues from the production of antibiotics were found to contain growth-promoting

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 ABSTRACTER: F. Bruce Sanford

6.139

Table III. Destruction of B-vitamins during drying of standard meal

Inlet temperature	Presscake γ/g protein	Meal γ/g protein	Total loss γ/g protein	Loss in %
Riboflavin				
1. flame drying, 700-785°C.	6.8	5.5	1.3	19.1
2. flame drying, 700-720°C.	7.5	7.3	.2	2.7
3. flame drying, 400-410°C.	6.3	6.1	.2	3.2
4. air drying, 230-130°C.	7.8	7.3	.5	6.4
5. steam drying	7.6	7.3	.3	3.9
Vitamin B_{12}				
1. flame drying, 700-785°C.	.34	.22	.12	35.1
2. flame drying, 700-720°C.	.31	.29	.02	6.5
3. flame drying, 400-410°C.	.34	.33	.01	2.9
4. air drying, 230-130°C.	.40	.36	.04	10.0
5. steam drying	.33	.32	.01	3.0
Pantothenic acid				
1. flame drying, 700-785°C.	28.9	16.3	12.6	43.5
2. flame drying, 700-720°C.	25.0	24.6	.4	1.6
3. flame drying, 400-410°C.	27.4	26.6	.8	2.9
4. air drying, 230-130°C.	28.0	22.7	5.3	19.0
5. steam drying	27.5	26.5	1.0	3.6

6.190

substances, and the residues were soon offered to the feed trade as animal protein factor supplements. The propriety of using the term "animal protein factor supplement" was questioned in that it was thought to be confusing to the trade. At the October 1950 meeting of the American Feed Control Officials, the definition animal protein factor supplement was discontinued. In its place, definitions were adopted for vitamin B_{12} supplement and antibiotic feed supplement.

An interesting byproduct of the recent research on the use of methionine has been the finding that methionine is most effective in improving the efficiency of chick starter and broiler rations when fish meal is also present in the rations.

A new growth factor has recently been discovered in fish meal and condensed solubles. Eventually, the factor will be identified and possibly synthesized. Its synthetic production, however, should not affect the market for quality fish meal or condensed solubles, for they are products of multiple values. The author points out that to judge fishery products on their content of any one constituent alone would be like judging an automobile on its body design alone, without considering its motor, brakes, or other features.

The attitude of the feed nutritionist is now definite. He wants quality fish meal and quality condensed solubles. Consequently, the emphasis of the fish processor must be on the quality of his products. If quality is maintained, fishery byproducts will find a ready market -- certainly for as long as the present high level of feed sales continues.

6.3

II. Laminaria cloustoni frond

The drying characteristics of freshly harvested Laminaria cloustoni frond have been investigated in a through-circulation drier.

Drying factors investigated were bed depth (0.5-4 in.), particle size (minced and shredded), air velocity (3-7 lb./(sq. ft.)(min.)), air temperature (130-220°F), air wet-bulb depression (53-123°F), and the seasonal variation of drying times. In most of the tests reported, the fronds were minced before drying.

The general effect of air velocity, air temperature and humidity on the drying time is similar to that for L. cloustoni stipe, and a comparison test showed that minced frond dried slightly faster than the shredded material. Drying rates of frond beds at average water contents of 2.5-0.2 lb./lb. (dry basis) have been found to be directly proportional to the wet-bulb depressions of the air.

Two outstanding differences in the behaviour of frond and stipe are the effects of bed depth and seasonal variation. The frond-output/dry-loading curve rises to a well defined optimum point at 0.45 lb. of B.D.S. (bone-dry solid)/sq. ft. (1-1 1/2 in.) for minced and 0.6 lb. of B.D.S./sq. ft. (4-4 1/2 in.) for shredded frond. It is suggested that the low optimum loading is a result of the stickiness and lack of rigidity of the frond bed.

Drying times may vary three- or four-fold, according to the month in which the frond was harvested. This fluctuation has been tentatively related to the salt content and water ratio of the frond, which vary in a similar manner to the drying times. The maximum drying times for frond are encountered in May-June.

A drying test conducted on a commercial through-circulation grass drier demonstrated that frond can be dried on the large scale by through-circulation drying.

The maximum air temperature that L. cloustoni frond can withstand for reasonably long periods without scorching is 225°F.

A formula is given for the calculation of the static pressure drop of air passing through beds of dried minced L. cloustoni frond 1-9 in. deep (random packing).

6.135 (Cross Reference: 3.18)

air conditioning systems, however, a different arrangement of tubes and control gear is required for mounting in the duct work.

For every part of ozone formed, 6,000 parts of air must be irradiated. To calculate the amount of ozone and with it the amount of fresh air needed to provide the necessary number of reactive oxygen molecules the maximum air contamination may be assumed not to exceed 10 p.p.m. Contamination by putrescine, for example, means that there will be 6.88×10^{16} molecules of putrescine in every gram of air. Since 1 gram of ozone contains 12.61×10^{21} molecules, there will be available a safety factor of approximately 183,500. If only 1 gram instead of 6,000 grams of air were irradiated, only 30 times the necessary amount of ozone would be present. This quantity usually yields an ample factor of safety.

Ultraviolet air deodorization equipment has been proven effective in such varied installations as slaughterhouses, hospitals, waste processing departments, pathological and industrial laboratories, refrigerated cargo vessels, kitchens, dining rooms, food plants, fertilizer plants, pharmaceutical plants, etc. The equipment is relatively inexpensive to install, and can be operated on as little as 1200 watts of electricity per 24 hour day.

1.95 CAMBRIDGE SCIENTISTS SEEK BETTER UTILIZATION OF WHALE MEAT

Anonymous
Chemical and Engineering News 31, No. 24, 2510 (June 15, 1953)

A group of Cambridge scientists, who have been studying whales as sources of food since 1946, recently recommended that British whaling vessels be equipped with freezers and refrigerated storage holds so that large quantities of frozen whale meat could be brought from the Antarctic for sale at home.

Whale meat is most frequently criticized as a food because of the presence of a fishy flavor. The possibility exists that with a new method of flensing and processing, fishy flavors and other unpleasant tastes may be eliminated from the flesh. Decreasing the time interval between the death of the animal and the removal of the fillets from the back and sides of the carcass should help to solve the existing flavor problems.

Potentially, the 1951 catch of 26,500 whales could have yielded 250,000 long tons of lean meat or the equivalent of a quarter of the total boneless fresh meat consumed in Britain in 1950. On the present market the oil and flesh in the form of dried ground meat meal from an average blue whale sells for about $6,580 and $5,000, respectively. A flourishing fresh whale meat industry would add an additional $2,240 to the value of each whale processed.

 ABSTRACTER: Martin Heerdt

1.0111 CANADA'S FRESHWATER FISHERIES

Anonymous
Canadian Fisheries Annual 1953, pp. 59-63

Canada, with half the fresh water in the world, has the world's largest commercial fresh-water fishery. That country's catch of fresh-water fish for 1952 was expected to reach a new high of 102.5 million pounds, of which 75 percent was exported to the United States. The market value of the fresh-water catch reached a maximum of $21 million in 1951. Capital investments in boats, gear, and port facilities now approximates $11 million. Approximately 19,000 commercial fishermen are employed in the fresh-water fisheries of Ontario, Manitoba, Quebec, New Brunswick, Saskatchewan, Alberta, and the Northwest Territories. Some 3,000 of these fishermen confine their work entirely to the Great Lakes.

Ontario produces between 30 and 35 million pounds of fish annually. The commercial fishing areas of Ontario are centered in the region of the Great Lakes, which are fished almost exclusively in the summer, and in the region of northwestern Ontario, which is fished mainly in the winter. On the Great Lakes, fish are taken on inshore and on offshore banks similar in nature to those of the ocean. In some of the lakes the areas of shallow water extend far from shore and provide a considerable area for gill net fishing with powered vessels. Large quantities of fish are also taken along shore in fixed pound nets or traps. Whitefish, pickerel (both blue and yellow), perch, and herring are the most important species of fish taken. Other species of lesser importance include lake trout, pike, sturgeon, tullibee, saugers, eels, catfish, and carp.

(over)

 ABSTRACTER: Martin Heerdt

2.00 ENZYMIC REDUCTION OF TRIMETHYLAMINE OXIDE

Tsuchiya, Tasuhiko and Endo, Eiichi
Tohoku Journal of Agricultural Research 3, No. 1, 127 (October, 1952)

The reduction of trimethylamine oxide by the bacterial enzyme, with special reference to the factors affecting its activity, was studied.

Under the conditions employed in this experiment the following results were established: (1) The reaction of the reduction of trimethylamine oxide was sigmoidal. The production of trimethylamine satisfied the equation, $\log \frac{a}{a-x} = k(t-t_1)$; (2) The reduction of trimethylamine oxide was weakened as the acidity of the medium increased, with the optimum pH at or slightly above 7.3; (3) Each culture contained a heat-labile enzyme which was inactivated by heating for 5 minutes at 80°C.; (4) Glucose, fructose, alanine and glycine could replace sodium lactate as a source of hydrogen; (5) Heavy-metal compounds such as mercuric chloride and cupric acetate strongly inhibited the reduction of the oxide.

It should be pointed out that, in these experiments, the enzyme extract was not isolated from the bacterial cells. Consequently, it remains unknown whether it is the action of the enzyme itself or the growth of the cells that produce the enzyme that is affected by change of pH and temperature and by inhibitory substances.

 Author's summary reprinted in part

2.2 STEEL BARGE CAN BE USED AS PERMANENT DOCK

Anonymous
Chemical and Engineering News 31, No. 21, 2234 (May 25, 1953)

A floating steel barge that can be towed to any desired location and jacked up and out of the water by means of steel tubes is presently being fabricated at Orange, Texas. When elevated into position the barge becomes a wharf for temporary offshore or commercial port operations. The versatility of the barge is such that within a matter of hours the wharf can be lowered down into the water, hooked onto a tug, and towed to a new location. If more area is desired, several barges can be erected end to end and welded to form a single wharf.

The wharf-barge is similar in construction details to the conventional steel barge; furthermore, it floats and handles like a regular barge when in the water. Elevation is made possible by a series of wells extending from the deck to the bottom of the barge along the sides of the hull. When the wharf is to be erected, 100-foot steel tubes are dropped through the wells and through the jacks set around the tops of the wells and driven with a pile driver into the sand until a solid footing is reached.

Each jack consists of a steel cylinder 6 feet in diameter and 7 feet long with contoured ribs. Actually, the jack is divided horizontally at the center to form two sections, each of which is equipped with air-actuated rubber grippers that resemble tire tubes encircling the inside wall between the jack and the steel pile. A similar set of grippers encircles the tube between the upper and lower jack sections. When the wharf is in place and the steel piles are on bedrock, the upper jack is raised 6 inches above the level of the deck and secured in place. Next, the grippers of the lower jack are inflated so as to

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 ABSTRACTER: Martin Heerdt

UTILIZATION OF WHALE MEAT

ENZYMIC REDUCTION OF TRIMETHYLAMINE OXIDE

CANADA'S FRESH-WATER FISHERIES

PORTABLE DOCK

2.2

grasp the steel pile. Raising the barge for a total of 6 inches can now be accomplished simply by inflating the set of grippers between the upper and lower jacks.

To continue the operation the grippers in the upper jack are inflated so that the present barge level will be retained while the lower grippers are released and the center tirelike tube is deflated. Deflation causes the center section and the lower jack to be drawn upward, where the latter is again clamped into position for a repetition of the cycle. Lowering the wharf is simply a matter of reversing the raising operation until the barge again floats on the water. As soon as the steel piles have been pulled out of the sand and withdrawn from the jack wells, the barge is ready to be towed to a new location.

1.95 (Cross Reference: 6.54)

1.0111

Fishing operations in the lakes of the prairie provinces of Manitoba, Saskatchewan, and Alberta are very much alike. Gill nets set from 32-foot motor-driven boats or 20-foot skiffs are the gear in general use. During the winter months the same gill nets are set through holes cut in the ice.

Manitoba's commercial fishing industry has grown over a period of 70 years until some 200 fishing vessels, over 2,000 skiffs, and 6,578 men are employed during the open-water seasons. For the past 10 years Manitoba has produced an annual edible catch in excess of 30 million pounds. One half of this total catch comes from Lake Winnipeg.

Alberta, with 5,156 fishermen, produced almost 10 million pounds of tullibee, whitefish, pike, pickerel, perch, and trout in 1951-52, for which the fishermen received $654,000. In the same year Saskatchewan, with a total of 1,674 fishermen, produced 11 1/2 million pounds of lake fish valued at $909,590 to the fishermen. Northwest Territories became a commercial producer of fresh-water fish in 1945 with the opening of Great Slave Lake. The present catch from Great Slave Lake averages 7 to 8 million pounds annually and yields an income of $600,000 to some 700 fishermen.

Quebec's fisheries, in which 1,300 fishermen participate annually, are based on the streams that flow into the St. Lawrence River, although some of the northern waters are also productive. Quebec fishermen receive an average of $500,000 annually for their efforts. Eels, sturgeon, and catfish are the most profitable species taken.

New Brunswick's fresh-water fishery is a comparatively small enterprise producing about 1 million pounds annually consisting primarily of alewives, eels, salmon, and suckers.

7.80 THE DETERMINATION OF THE DEGREE OF FRESHNESS OF FISH

Partmann, W.
Z. Lebensmitt.-Untersuch.u.-Forsch. 93, 341-356 (1951)

The practical value of the following measurements was investigated: pH value, trimethylamine oxide concentration, total nitrogen, basic nitrogen, amino nitrogen, and tyrosine content. In fish flesh immediately after death, considerable variations in these values were observed; therefore none of the hitherto recognized routine methods should be regarded as giving more than relative values. The tyrosine test is considered to be the best index of the extent of bacterial changes in fish flesh. The next best is the determination of basic nitrogen; changes in amino nitrogen occur only at an advanced stage of bacterial decomposition. The trimethylamine test is suitable for the detection of bacterial spoilage in marine fish. The results of chemical determination of basic nitrogen were fairly well correlated with organoleptic tests (odour). Histochemical studies concerning the course of penetration by various bacteria into fish tissues are reported. The total number of bacteria is not an absolute measure of the degree of freshness or contamination. The type of contamination is an important factor, and it is probable that some components of the tissue, e.g. the fish muscle are more resistant than others.

(The above abstract appears in Food Science Abstracts 25, No. 2, 155, March, 1953 and is reprinted here)

5.6 A NEW FORM OF VITAMIN D

Anonymous
Nutrition Reviews 11, No. 6, 179-180 (June, 1953)

The initial steps in the activation of 2-4,2[1]-4[1] bicholestadiene, a product of partial oxidation of cholesterol containing two double bonds, are described in detail by the French workers Y. Raoul et. al., in Compt. rend. 229, 259 (1949); 232, 1258 (1951); 234, 2493 (1952). An intermediate "substance P", characterized by a maximum absorption at 255 millimicrons can be transformed by chemical treatment into two closely related compounds, "substance A" and "substance B", both of which show vitamin D potency. When assayed in rats, substance A and substance B showed an antirachitic activity of 20,000 I.U. per milligram, or an activity of the same order of magnitude as that of vitamins D_2 and D_3.

More recently Y. Raoul et al., Compt. rend. 235, 1439 (1952) demonstrated that the new form of the vitamin, which they identified as vitamin D_7, as well as its inactive precursor (substance P), can be isolated from fish liver oils. One method of isolation based on saponification of cod liver oil followed by a series of ether extractions, yields the active form as a calcium complex. A number of adsorptions on alumina columns, followed by elution, concentrations in vacuo, and low-temperature precipitations were used in the final purification. The precursor is most easily prepared from shark liver oil concentrate. Here the method of preparation is one of adsorption on alumina columns, elution, removal of vitamin A and preformed vitamin D_7 by repeated carbon tetrachloride extractions, saponification, and a number of reprecipitations.

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 ABSTRACTER: Martin Heerdt

7.80 THE DEVELOPMENT OF A NUMERICAL SCORING SYSTEM FOR THE SENSORY ASSESSMENT OF THE SPOILAGE OF WET WHITE FISH STORED IN ICE

Shewan, J. M.; MacIntosh, Ruth G.; Tucker, C. G.; and Ehrenberg, A. S. C. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 4, No. 6, 283-298 (June, 1953)

The authors have classified the sensorily perceptible quality-factors of cod fish stored in ice from absolute freshness through varying degrees of spoilage to putridity. The quality classifications for both the raw fish and the cooked fish have received numerical values as an aid in handling and interpreting the results. Consistency among the members of a taste panel trained to agree in assessing any one sample has been discussed on the basis of some of the experimental data.

This method of classifying fish spoilage is believed to be valuable in that only those factors that would give rise to opinions of preference in the ordinary consumer are used. The practical accuracy obtained by the panel enabled them to clearly differentiate within one or two days, between samples of fish stored in ice under certain standard conditions.

The score sheet used in evaluating the organoleptic characteristics of both raw and cooked white fish appears on this card, over.

(over)

 ABSTRACTER: Martin Heerdt

7.53 REPORT ON FAT IN FISH MEAL

Stansby, M. E. (Department of the Interior, Fish and Wildlife Service, Seattle, Washington)
Journal of the Association of Official Agricultural Chemists 36, No. 2, 202-208 (May, 1953)

Hydrolysis of fish meal with hydrochloric acid followed by extraction with ethyl and petroleum ethers using Mojonnier equipment gives lower oil content than is obtained by the AOAC acetone extraction procedure.

A method is being investigated in which the fish meal is refluxed with a solvent such as acetone. This procedure has the advantage that the composition of the extracting solvent in contact with the meal can be varied. For example, acetone-water mixtures of various ratios can be employed or acetone-contained added acids such as hydrochloric or acetic can be used.

Table 1. Effect of acids of different strengths in acetone upon quality of extractives obtained from fish meal

	Acetone with no added acid %	Acetone with 0.01 N HCl acid %	Acetone with 0.01 N formic acid %	Acetone with 0.01 N acetic acid %
A Gross extract	13.0	15.9	15.8	13.5
B Ethyl ether purified extract	12.8	14.3	14.4	13.3

It was found that addition of a weak acid, such as formic, to the extracting acetone increased the amount of oil extracted. Also, acetone extraction of the meal with three successive solutions, the first and third of which were pure acetone and the second a

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 ABSTRACTER: M. E. Stansby

DETERMINATION OF FRESHNESS OF FISH

ORGANOLEPTIC ASSESSMENT OF SPOILAGE

NEW FORM OF VITAMIN D

ANALYTICAL OIL EXTRACTION FROM FISH MEAL

7.80

General appearance (5 marks) — **Score marks**

Eyes perfectly fresh, convex black pupil, translucent cornea, bright red gills (colour depending on species) . no bacterial slime, outer slime water-white or transparent . bright opalescent sheen, no bleaching 5

Eyes slightly sunken, grey pupil, slight opalescence of cornea ; some discoloration of gills and some mucus ; outer slime opaque and somewhat milky ; loss of bright opalescence and some bleaching 3

Eyes sunken ; milky-white pupil, opaque cornea ; thick knotted outer slime with some bacterial discoloration 2

Eyes : completely sunken pupil ; shrunken head covered with thick yellow bacterial slime ; gills showing bleaching or dark brown discoloration and covered with thick bacterial mucus ; outer slime thick yellow-brown . bloom completely gone . marked bleaching and shrinkage 0

Flesh, including belly flaps (5 *marks*)

Bluish translucent flesh, or reddening along the back-bone and no discoloration of the belly flaps : kidney bright red 5

Waxy appearance, or reddening along backbone, loss in original brilliance of kidney blood, some discoloration of belly flaps 3

Opaque flesh, marked red or brown discoloration along back-bone, very brown to earthy-brown kidney blood, and marked discoloration of the flaps 0

Odours (10 *marks*)*

Fresh, seaweedy ' odours 10

Loss of fresh ' seaweediness ', shellfish odours 9

No odours, neutral odours 8

Slight musty, acetamide-like, milky or caprylic acid-like odours 7

' Bready ', malty ', yeasty ' odours 6

Lactic acid, ' sour milk ', or oily odours 5

Some lower fatty acid (e.g. acetic or butyric acids), or ' rimmy ', slightly sweet, fruity odours 4

Stale, sour, ' cabbage water ', ' turnipy ', or phosphine-like odours 3

Hydrogen sulphide, other sulphide and strong ammoniacal odours 2

Ammoniacal (trimethylamine and other lower amines) with strong o-toluidine-like odours 1

Nauseating, putrid, faecal odours ; indole, ammonia, etc. 0

Texture (5 *marks*)

Firm, elastic to the finger touch 5

Softer flesh, definite brittleness and scales easily rubbed off the skin 4

Softening of the flesh, some brittleness on skin 3

Very soft and flabby, retains the finger indentations, brittleness quite marked and flesh easily torn from the back-bone 1

Cooked fish (approx. 6–8 oz. middle cut of fish steamed on casserole (in resistance-glass dishes (7 in. in diameter) over boiling water for 35 minutes

Odour (10 *marks*)*

Strong fresh, seaweedy ' odours 10

Some loss of fresh, seaweediness ' 9

Lack of odour, or neutral odours 8

Slight astringency of the odour but no sour or stale odour ; ' wood shavings ', woodamp ', vanillin or terpene-like odours ; slight salt-fish or cold storage odours 7

' Condensed milk ', caramel or toffee-like odours 6

' Milk jug ', ' boiled-potato ' or ' boiled clothes ', or metallic odours 5

Some lower fatty acid (e.g. acetic or butyric acids) ' rimmy ', ' soapy ', ' turnipy ' or ' tallowy ' odours ... 4

Lactic acid, sour milk ' or *o*-toluidine-like odours 3

Ammoniacal (trimethylamine and lower amines) odours 2

Strong ammoniacal (trimethylamine etc) and some sulphide odours 1

Strong putrid and faecal odours (ammonia, indole etc.) 0

Texture (5 *marks*)

Firm thick white curd ; bluish-white in appearance, no discoloration 5

Firm, but woolly ; loss of bluish whiteness, some yellowing 3

Softer, cheesy ; marked discoloration 2

Sloppy, soapy ; very marked browning along the back-bone 1

Flavour (10 *marks*)*

Fresh, sweet flavours characteristic of the species 10

Slight sweetness and loss of the flavour characteristic of the species 9

Some loss of sweetness 8

Neutral flavour, definite loss of flavour but no off-flavours 7

Absolutely no flavour, as if chewing cotton wool 6

Trace of off-flavours, some sourness but no bitterness 5

Some off-flavours, and some bitterness 4

Strong bitter flavours, some rubber like and slight sulphide-like flavours 3

Strong bitter flavours, but not nauseating 2

Strong putrid flavours (*e.g.* sulphides) tasted with difficulty 0

* **The descriptive terms, although capable of irrelevant associations, are those used spontaneously and agreed upon by the original panel at the Torry Research Station. Other panels may tend to use other, but probably similar, terms. A more precise terminology, replacing ordinary descriptive terms by suitable chemical analogues, is being continuously pursued.**

7.53

mixture of acetone and water, gave greater oil extraction than continuous extraction with pure acetone. In each case the crude extract was "purified" by dissolving the oil in ethyl ether, filtering and recovering the oil. Examples of results obtained follow.

Table 2. Effect of acetone-water ratio on efficiency of extraction of fish meal

Stage of Extraction	Acetone %	Water %	Oil content Gross extract %	Oil content Ethyl ether purified extract %
1st Stage	100	0	11.80	11.73
2nd Stage	100	0	1.14	1.05
3rd Stage	100	0	0.47	0.19
Total			13.41	12.97
1st Stage	100	0	11.84	11.85
2nd Stage	96	4	3.35	2.97
3rd Stage	100	0	0.35	0.22
Total			15.54	15.04
1st Stage	100	0	12.18	12.13
2nd Stage	92	8	4.00	3.41
3rd Stage	100	0	0.33	0.20
Total			16.51	15.74
1st Stage	100	0	11.80	11.65
2nd Stage	75	25	6.30	4.61
3rd Stage	100	0	0.52	0.44
Total			18.69	16.70

5.6

Appreciable amounts of both vitamin D_7 and its precursor were found in cod liver oil, whereas tuna liver oil was a rich source of preformed vitamin D, and shark liver oil was a rich source of the precursor to vitamin D_7. Values for the carbon and hydrogen content and the antirachitic activity of the new synthetic and the natural vitamin D_7 were in agreement on a weight basis.

2.1122 NEW DEVICE "FEELS" WHEN FISH STRIKES HOOK

Anonymous
Commercial Fisherman XX, No. 6, 5-6 (June, 1953)

In trolling for mackerel a lead sinker weighing from two to three pounds is usually used in order to get the hooks down to the right depth below the surface. This makes it necessary for the fisherman to keep his finger on the line to enable him to feel when a fish strikes the hook.

During the course of experimental work in developing the "Phantom" pelagic trawl it was recognized that the paravane principle could also be used in other types of fishing to replace heavy sinkers. As a result, the "Stim" was developed.

The "Stim" is made of light metal alloy and weighs only one-third of a pound. Its streamlined shape makes it go down through the water very rapidly. By attaching the towing line to different holes in the vertical fin, the paravane can be made to travel at different depths. The leader can be fastened in different holes in the rear horizontal fin causing the paravane to sheer outwards from the boat toward the side on which the leader has been fastened and at the distance desired by the fisherman. When a fish strikes, the "Stim" goes out of balance and rises to the surface immediately. This also occurs when seaweed or any other object is caught on the hook.

The "Stim" can be used from any type of boat. The normal towing speed should be two to four knots. If the paravane rises to the surface without a fish it is an indication that the speed of the boat should be decreased or that the leader should be attached one hole nearer the center.

 ABSTRACTER: Roy C. Stevens

2.113 TESTS OF THE PROTECTIVE VALUE OF METALLIC COATINGS UNDER SHELTERED CONDITIONS (MARINE ATMOSPHERE)

Clarke, S. G. and Bradshaw, W. N.
Journal of Applied Chemistry 3, No. 4, 147 (April, 1953)

Results of tests on the corrosion of a range of coatings on steel (electroplated zinc, cadmium, tin, lead, silver, lead-tin, tin-zinc and sprayed aluminum) and of silver coatings on aluminum are presented; the tests were carried out with special reference to the behaviour of parts that are to be used or stored inside unsealed boxes, lockers or cabinets in a marine environment.

The common coating-metals corrode very slowly to a similar degree, but, owing to local penetrative action by salt particles, the thickness of the coating layer required to prevent rusting is greater than if the corrosion were uniform. Metals anodic to steel, e.g. zinc and cadmium, by repressing rusting at local perforations, are fully protective in layers thinner than those of cathodic metals, e.g. tin or lead. The effect of sulphurous pollution from industrial and domestic combustion products is far-reaching, and produces a strong sulphate component in a marine test-location remote from large towns.

 Author's summary

3.231 HIGH LABOR COSTS, WASTE ELIMINATED BY MECHANIZED BREADING OF OYSTERS

Anonymous
Food Processing 14, No. 7, 18-19 (July, 1953)

Oysters are generally considered to be the most difficult to handle of all foods that are breaded prior to freezing. Labor costs have been high and difficulty has often been encountered in attaining uniformity of breading. However, with the installation of automatic breading equipment a Tilghman, Maryland plant now employs only two operators to handle the same volume that previously required 20 to 30 women. The continuous automatic equipment consists of two separate breading sections with a batter application between. The only manual operations involved are placing the oysters on the moving belt at the start of the process and picking them up when breading is completed and placing them on trays that go to the freezers.

The steps in the breading operation are as follows: (1) Breading material is supplied to the belt through a chute; (2) The oysters are placed on the belt; (3) More breading is dropped onto the oysters; (4) Breading is plowed over the product; (5) Excess breading is removed from the oysters as they travel on a stainless steel wire conveyor; (6) The oysters are dipped in batter; (7) Another stainless wire conveyor releases the excess batter; (8) The oysters then drop on a layer of breading; (9) More breading is dropped over them; (10) Excess breading is again removed by travel over a wire conveyor; (11) The oysters, completely breaded, drop on a table for hand packing.

The equipment consists of a channel- and angle-iron frame, galvanized iron breading chutes, stainless steel adjustable batter flume and hopper, a pump with stainless steel

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 ABSTRACTER: Roy C. Stevens

3.230 ULTRA MODERN FISH PROCESSING PLANT

Anonymous
Fishing Gazette 70, No. 5, 40-42, 58 (May, 1953)

An ultra-modern, completely mechanized fish processing plant featuring a battery of eight automatic filleting machines has recently been constructed at Gloucester, Massachusetts. The entire operation, from the unloading of the fish to the freezing of the packaged fillet, is a streamlined mechanical conveyance.

As the fish come from the vessels they are carried on a conveyor to the heading machines, passing en route through a jet-spray washing process. When the heads have been removed, the fish drop into a flume carrier and are taken to a scaling machine. The scaled fish then move via stainless steel mesh conveyors to the automatic filleting machines.

Each filleting machine is operated by one man who merely places the fish in the channel where it is guided into the cutting mechanism by a mechanical hand. The fillets are carried on a moving belt to a specially-constructed brine tank, while the waste is taken out of the plant on another belt. From the brine tank, the fillets pass to a Plexi-glass inspection table where each fillet is carefully inspected.

From the inspection table the fillets are carried on stainless steel mesh conveyors to the packing and weighing department. This is designed in the form of a horseshoe-shaped bay that accommodates 40 packers. Each worker has an individual table with a receiving plate and a one-pound scale. The fillets are weighed and packed in waxed fiber, laminated cartons. The packages then pass along to the wrapping department where

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 ABSTRACTER: Roy C. Stevens

TROLLING PARAVANE

MECHANIZED BREADING OF OYSTERS

CORROSION RESISTANCE OF METALLIC COATINGS

NEW FISH PROCESSING PLANT

3.231 (Cross Reference: 1.81)

tubing and fittings, stainless steel wire belts for separating batter and breading from the oysters, and neoprene conveyor belts for moving the oysters from one step of the process to another.

3.230

they are automatically wrapped and sealed air-tight in cellophane, parchment, or vellum paper.

By eliminating much of the actual handling of the fish, the mechanized operation materially reduces bacterial contamination.

8.53 THE LIPIDS OF FISH. 3. THE ACETONE-INSOLUBLE FRACTION OF AN ACETONE EXTRACT OF THE FLESH OF HADDOCK

Olley, June and Lovern, J. A. (Torry Research Station, Aberdeen, Scotland)
Biochemical Journal 54, No. 4, 559-569 (July, 1953)

Crude acetone extracts of haddock flesh contain a fraction nearly insoluble in cold (0°C.) acetone. This material, fractionated by counter-current distribution between light petroleum ether and 85% ethanol yielded principally two fractions of lecithin and two fractions of unidentified lipid. Fatty acid analyses, carried out on some of the fractions obtained gave the results shown in Table 2, over.

The composition of the entire lipid fraction extracted from haddock flesh is shown in Table 4, over.

Seasonal variation in lipids extracted from haddock was not great.

Table 5. Seasonal variation in amount of various lipids extracted by acetone from haddock flesh

(All values as % of wet tissue.)

Sample	Crude phospholipin	Total non-phosphatidic lipid	Free fatty acid	Free cholesterol	Cholesterol esters	Triglycerides
Fish caught Aug.-Nov. 1951	0.43	0.10	0.036	0.036	0.020	0.014
Fish caught May 1952	0.44	0.08	0.034	N.D.	N.D.	N.D.
Fish caught Aug. 1952	0.61	0.15	0.034	0.048	0.034	0.011

N.D. Not determined

(over)

 ABSTRACTER: M. E. Stansby

8.53 THE LIPIDS OF FISH. 2. THE ACETONE-SOLUBLE LIPIDS OF THE FLESH OF THE HADDOCK

Lovern, J. A. and Olley, June
Biochemical Journal 54, No. 1, 128 (April, 1953)

1. An acetone extract of haddock flesh was separated into three fractions comprising (A) acetone-soluble non-phosphatidic lipids plus some lecithin, (B') mainly lecithin soluble in acetone in the absence of added electrolytes, and (C) acetone-insoluble lipids. The lecithin in (A) was partly genuinely soluble in acetone and partly soluble in the presence of other lipids. The significance of acetone-insolubility in the preparation of phospholipins is discussed.

2. Fractions of A and B' were studied by counter-current distribution between light petroleum and 85% (v/v) ethanol, followed by pooling of certain fractions on the basis of similar chemical compositions and analysis of the pooled material for various lipid constituents.

3. Fraction A consisted of about 32% lecithin, 18% free cholesterol, 18% free fatty acids, 10% cholesterol esters, 8% waxes, 7% triglycerides, 2% hydrocarbons, etc. and 5% non-lipid matter. The free fatty acids were a genuine constituent of haddock flesh and not a post-mortem artifact. Fraction B' consisted of about 61% lecithin, 6% waxes, 1% hydrocarbons, etc., and 32% unidentified material, including probably 4% plasmalogens.

4. Detailed fatty acid analyses of the lecithins in fractions A and B' revealed exceptionally high proportions of highly unsaturated C_{20} and C_{22} acids, with a curious total lack of hexadecenoic acid and unusually small amounts of C_{18} unsaturated acids.

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 Author's summary

8.6179 EXAMINATION OF SOME COMPONENTS OF CEPHALOPOD AND SPERM-WHALE LIVER OILS BY THE CHROMATOGRAPHIC METHOD

Brachi, R. M. (British Food Manufacturing Industries Research Association, Leatherhead, Surrey)
Biochemical Journal 54, No. 3, 459-465 (June, 1953)

The whalebone whales Mystacoceti of the Antarctic are represented chiefly by the blue, Balaenoptera musculus; fin, B. physalus; and humpback, Megaptera nodosa. They live almost entirely on krill (Euphausia superba dana), a crustacean in which the presence of preformed vitamin A has been demonstrated. The oils derived from the three species of whales are very similar.

The toothed whales, Odontoceti, of the Antarctic are represented only by the sperm, Physter catodon, which feeds mostly on cephalopods of the 10-armed variety. Oil from the sperm whale is rich in hexadecyl alcohol and other waxy substances and therefore is unlike that from the whalebone whales.

The whaling industry has long suspected the presence of preformed vitamin A in cephalopods. To substantiate this theory, one suitable cephalopod, Moroteuthis ingens Smith, with an over-all length of 36 inches, was obtained from the stomach of a whale during the 1951-52 whaling season. Oil from the liver of this cephalopod and from the liver of a sperm whale was extracted and examined for preformed vitamin A, carotenoids, and other derivatives of vitamin A.

The presence of vitamin A in the liver of the Antarctic cephalopod was confirmed; and, in addition, the presence of provitamin D, and astacene (or astaxanthin) was

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 ABSTRACTER: Martin Heerdt

8.6170 EXAMINATION OF SALPS

Brachi, R. M. (British Food Manufacturing Industries Research Association)
Biochemical Journal 54, No. 3, 466 (June, 1953)

In the hope of obtaining fresh krill for experimental purposes, a small conical plankton net was towed from the stern of a factory whaling vessel whenever reddish patches of plankton were sighted on the sea surface. Only one of a variety of small pelagic creatures taken in the net occurred in sufficient quantity to make their examination worthwhile. No evidence was obtained to indicate that these particular pelagic creatures are eaten by whales. A description of them and of their pigments, however, may be of value.

Most of the small creatures (Annelids, Crustacea, and Tunicates), however diverse their shapes and sizes, contained similar pigmentation. This pigment consisted of red material associated with astaxanthin, and a greenish material found to consist of the stomach, liver, etc., all included in a mass of transparent matter. These parts are closely associated in the salps and consist of barrel-like shapes of jelly up to 5 cm. in length. Each contains a red inclusion.

A number of these red inclusions was dissected out, dried by grinding with anhydrous sodium sulfate, and extracted in a Soxhlet apparatus with peroxide-free ether. On removal of the solvent, 0.14 g. of heterogeneous ether-soluble matter was obtained from 37.62 g. of wet material. A cyclohexane solution of this ether-soluble matter was yellow-green after filtration and gave maxima at 270, 426, and 450 mμ with a slope change at 475 mμ. The absorption intensity was greatest at 426 mμ ($E^{1\%}_{1cm}$ = 18.3).

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 ABSTRACTER: Martin Heerdt

8.6179 (Cross Reference: 1.95)

detected. Vitamin A isolated chromatographically from raw sperm-whale liver was compared with the Morton standards of 1948 and 1951. These figures indicate a different proportion of all-trans- and neovitamin A than is present in factory-produced whale-liver oil; therefore, some isomerism must occur during drying and extraction by factory methods. The anhydrovitamin A fraction of raw sperm liver was found to contain a carotenoid believed to be carotene. An unidentified substance present in the "oxidized material" fraction was partially purified.

8.6170 (Cross Reference: 1.89)

Saponification of some of the ether-soluble extract at room temperature using methanolic potassium hydroxide covered by a layer of n-hexane yielded a bluish lower layer. This layer is the only indication thus far of the presence of astaxanthin rather than astacene in the raw material.

8.53 (Cross Reference: 4.13)

Table 2. Composition of the fatty acids of certain lipids of haddock flesh
(All weights as % of total acids. Figures in brackets indicate average unsaturation in hydrogen atoms.)

	Saturated acids			Unsaturated acids		
Lipid	C_{16}	C_{18}	C_{20}	C_{18}	C_{20}	C_{22}
Lecithin A*	13.5	5.7	2.9	12.6 (-5.4)	33.7 (-8.0)	27.3 (-12.0)
Lecithin B'	16.4	4.0	2.1	5.4 (-5.5)	42.2 (-8.0)	29.9 (-11.0)
Lecithin 1(C)**	20.4	13.5	---	21.5 (-4.0)	28.5 (-7.0)	13.4 (-10.4)
Lecithin 2 (C)	22.7	4.8	0.8	16.1 (-3.3)	34.3 (-7.4)	21.3 (-9.7)
Unidentified 1 (C)	4.8	17.8	3.5	7.2 (-4.6)	46.1 (-7.2)	20.6 (-12.0)
Unidentified 2 (C)	6.1	17.9	2.2	8.4 (-2.0)	39.9 (-4.6)	25.5 (-11.1)

* Plus 4.3% C_{24} unsaturated acids. ** Plus 2.7% unsaturated (-4.0) C_{16} acids.

Table 4. Composition of the total lipids extracted by acetone from haddock flesh

	(%)		(%)		(%)
Lecithin	39.2	Free fatty acids	6.3	Triglycerides	2.4
Unidentified lipid	12.5	Phosphatidyl		Hydrocarbons	1.3
Free cholesterol	6.4	ethanolamine	4.7	Plasmalogens	0.9
Waxes	6.3	Cholesterol esters	3.5	Non-lipids	16.5

8.53 (Cross References: 7.53, 4.13)

The free fatty acids were in some respects intermediate in type between those of the lecithins and those of haddock depot fat. The significance of these fatty acid compositions cannot be assessed until all the lipid fractions of the tissue have been similarly examined.

5. Certain fractions were quite rich in uncharacterized nitrogen, and early observations of the presence of firmly bound nitrogen in the fatty acids liberated from phospholipins were confirmed.

2.113 RUSTING PREVENTED BY USE OF "INHIBITED SALT"

Anonymous
Chemical Processing 16, No. 6, 174-175 (June, 1953)

A compound originally developed as an inhibitor of the corrosive effects of salt and used initially for rust-proofing military products has become valuable as an additive in providing non-rusting salt for de-icing streets, highways, and parking lots. More recently this compound has been used as a rust inhibitor in conjunction with salt for use in the ice bunkers of refrigerator cars, in refrigerated brine used in food processing and cold storage plants, and in salt used for regenerating zeolite water softeners.

When present in water solutions of salt, the rust inhibitor deposits a thin but tightly adherent protective film on clean or rusty metal surfaces. This film inhibits or prevents corrosion by excluding oxygen from the metal surface.

The rust inhibitor compound is an amorphous polyphosphate which when added to dry salt creates an inhibited salt. Amorphous polyphosphate for inhibitor purposes is a granular material that mixes readily with rock- or crystallized salt and may be incorporated into compressed pellets. Amorphous polyphosphate reportedly is non-toxic, and harmless to the skin, eyes, animals, leather, rubber, paint, and fabrics. Where desirable for purposes of identification in salt brines, an inert, non-staining fluorescent dye is incorporated in the commercial product.

 ABSTRACTER: Martin Heerdt

3.24 GLAZING BRINE-FROZEN SALMON

Miyauchi, D. T.
Commercial Fisheries Review 15, No. 5, 24-25 (May, 1953)

Red salmon that were caught in Bristol Bay were obtained from a freezership unloading at Seattle, Washington. These fish had been frozen by immersion for about 12 hours in a brine solution at about 5°F. and then transferred to a dry hold for storage at 5°F. At the laboratory, ten of the fish were placed in storage at 0°F. and ten at -20°F.

The ten salmon that had been stored at 0°F. for several days were glazed by immersing in water cooled to around 34°F. The glaze taken by the fish varied from good to poor in both quantity and quality. On some parts of the fish the glaze was "soft" (not hard frozen) and rubbed off easily; in other small areas there was no glaze whatever because the water had run off before it could freeze. Only two out of ten fish took a complete glaze. The fish were then sprayed with water and scrubbed with a brush. This washing increased slightly the amount of glaze that the fish would take; however, the glazing as a whole at 0°F. could not be considered satisfactory.

To determine whether these brine-frozen salmon would take a good glaze at a lower temperature, ten other fish that had been stored at -20°F. were dipped in cold water and then returned to the -20°F. room. All ten fish took a good glaze. Later, three of these fish were transferred to the 0°F. room and were examined the following day. Although the glaze was still intact, the ice had softened in some parts, particularly on the head. On contact, this soft ice easily fell away from the fish. In comparison, the glaze on the fish left in the -20°F. room was still hard. No tests were made at temperatures between 0°F. and -20°F.

 ABSTRACTER: D. T. Miyauchi

8.64 VITAMINS IN STICKWATER

Anonymous
Meld. S.S.F., No. 4, 77-82 (1951)

Results obtained by workers in other countries are reported and discussed. Spring herring can be as good a source of vitamins as large herring. The vitamin contents of stickwater prepared from stored and fresh herring are about the same. When stickwater is evaporated in a vacuum at 75° to 80°C. for 3 to 4 hours, the vitamin content is not affected by addition of acid. Evaporation under pressure at 135° to 140°C. for 2 to 3 hours is satisfactory; acidification does not protect vitamin B_{12}, but it does stabilize riboflavin. Addition of formalin to spring herring decreases the content of riboflavin but not of vitamin B_{12}. Evaporation of stickwater to 50% solids does not affect the vitamin B_{12} content, but evaporation to dryness decreases it.

 (The above abstract appears in Food Science Abstracts 25, No. 2, 147, March, 1953 and is reprinted here)

2.113 NO SINGLE ALLOY MEETS ALL SEA WATER CORROSION PROBLEMS

Anonymous
Chemical and Engineering News 31, No. 28, 2868, 2870 (July 13, 1953)

According to Frank LaQue of International Nickel Co., 3 percent chromium is the optimum quantity to use in alloy steel that is exposed to quiet sea water. When nickel is added as in the 18-8 series of stainless steels, pitting can be reduced but not eliminated entirely. In high-velocity sea water, however, stainless and high alloy steels offer improved resistance to corrosion because the water removes the solids from the metal surface as fast as they are deposited. Where the medium is moving sea water, alloys containing nickel, chromium, and molybdenum are the most satisfactory. Pump impellers fabricated from stainless steels have proved to be very satisfactory for use in handling polluted waters that subject conventional bronzes to accelerated attack. Where galvanic couples occur, the corrosion resistance of stainless steels is erratic and depends to some extent on the degree of passivity. If the area of stainless steel or bronze is small compared with the area of the coupled metal, it is best to avoid galvanic combinations.

The susceptibility of steels to intergranular corrosion, as explained by John Juppenlatz, of the Lebanon Steel Foundry, results from heating the metal in a critical temperature range. Temperatures in the neighborhood of 1200°F. reportedly cause dissolved carbon to be precipitated at the grain boundaries as chromium carbide. Attack occurs along these boundaries when the metal is exposed to corrosive media. Steels that are resistant to this form of corrosion can be made by three different methods.

 ABSTRACTER: Martin Heerdt

8.64 (Cross Reference: 6.134)

2.113 (Cross Reference: 3.231)

3.24 (Cross Reference: 1.30)

4.99 RELATION OF FEEDS TO STABILITY OF TURKEY CARCASS FAT

Anonymous
Nutrition Reviews 11, No. 7, 210-211 (July, 1953)

The stability of carcass fat to off-flavor development in storage is of major importance in turkeys where seasonal production requires rather long holding periods.

A. A. Klose, E. P. Mecchi, H. L. Hanson, and H. Lineweaver, J. Am. Oil Chem. Soc. 28, 162 (1951) demonstrated that the fatty acid composition of the carcass fats in turkeys is quite sensitive to changes in dietary fat. Furthermore, the composition of the carcass fat has a considerable influence upon its stability in storage. Two comparisons of 5 percent dietary levels of coconut and linseed oil indicated that doubling the iodine value of the carcass fat in the case of the linseed oil-fed birds caused a 25-fold decrease in the stability of the carcass fat.

More recently A. A. Klose et al., Poultry Science 31, 354 (1952), studied the influence of low levels of dietary fat on carcass composition and on stability of the carcass fat. Ration 1 was a simplified diet containing only 0.5 percent of fat. Rations 2, 3, 4, 5, and 6 were similar but contained in addition 2 percent of beef fat, corn oil, linseed oil, sardine oil, and soybean oil, respectively. Ration 7, containing about 5 percent of fat consisted of a standard commercial turkey growing ration of mash and grain with the mash containing 5 percent of fish meal and 0.35 percent of fish oil. The foregoing rations were fed for 17 weeks to turkey poults (8 birds per treatment) that had been grown to 2.5 kg. on regular turkey starting mash during the previous 13 weeks.

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6.193 FINDINGS IN POULTRY NUTRITION REGARDING UNIDENTIFIED GROWTH FACTORS

Combs, G. F. (University of Maryland)
Flour and Feed 54, No. 2, 13-14 (July, 1953)

At least two distinct unidentified growth factors are required in present-day practical poultry rations; however, the critical need for these factors may vary with the circumstances. One of these unidentified factors is provided by fish meal, fish solubles, crab meal, liver meal, whale solubles, and certain samples of meat scraps. The other factor appears to be present in dried whey, dried brewers' yeast, molasses, distillers' dried solubles, grain distillers' dried solubles, and various fermentation products. According to reports from the University of Maryland, a third unidentified factor appears to be supplied by either sun-dried or dehydrated alfalfa meal. Recent trials at the University of Maryland have confirmed the unidentified growth-promoting properties of alfalfa meal when fed in conjunction with purified diets. It would seem advisable, therefore, to retain the alfalfa level in most all-mash feeds at a minimum of 50 pounds per ton.

Other recent work at the University of Maryland in confirmation of observations made at Michigan State College indicates that orotic acid significantly stimulates growth in broilers to ten weeks of age. This response was obtained when using 15 mg. of orotic acid per pound of ration both in the presence and in the absence of supplemental methionine and 5 percent dried whey. The ration contained, in addition, 3.75 percent fish meal and 2.5 percent dehydrated alfalfa meal.

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6.193 PRIVATE LIVES OF UNKNOWN GROWTH FACTORS

Bird, H. R. (University of Wisconsin)
Flour and Feed 54, No. 2, 7-8 (July, 1953)

Vitamin B_{12} in the pure form has made it possible to distinguish the effects of other unknown factors from vitamin B_{12}. This was demonstrated at Beltsville with an experimental diet in which B_{12} replaced a concentrate from cow manure; at Merck laboratories with an experimental diet in which B_{12} replaced animal protein supplements; and at Minnesota with a practical diet in which B_{12} replaced animal protein supplements. These findings indicated that animal protein supplements could be regarded as simple protein-B_{12} supplements, and that they must compete with combinations of soybean meal and B_{12}. At this point reports from Maryland and Wisconsin indicated that growing chicks required an additional unknown growth factor supplied by animal protein supplements but not by corn and soybean meal as the major ingredients of the diet. At Beltsville it was subsequently determined that either result could be obtained depending upon whether fast or slow growing strains of chicks were used.

Fish meal, fish solubles, and meat meal are known to be good sources of the unknown growth factor; however, it is also found in other materials. At Maryland the factor was shown to be present in liver fractions and in yeast. With ordinary yeast an 8 percent level in the diet was required; however, one sample of Torula utilis or wood yeast was effective at the 3 percent level. One sample of dried cells of Bacillus subtilis was effective when fed at only 0.75 percent of the diet.

From the information gathered to date it appears that there are at least two unknown growth factors. One factor is present in fish and meat byproducts and in certain fermentation products, whereas the other factor is present in whey and perhaps distillers' solu-

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6.132 COAGULATING AGENTS. CALCIUM CHLORIDE AND FORMALIN

Anonymous
Meld. S.S.F., No. 6, 117-123 (1951)

The effect of coagulating agents in the cooking of herring for the production of meal and oil was investigated. Of 6 series of experiments, 4 were made with summer herring, 1 with large herring, and 1 with very small herring (mussa). Calcium chloride, formalin, and nitrite were used; some preliminary tests were also made with ferric chloride. The herring were sprayed with a solution of the coagulating agent, a comparable sample being sprayed with water as a control, and autoclaved for 45 minutes; they were then pressed in a steam-heated hydraulic press for 5 minutes at pressures of 0 to 2, 2 to 5, and 5 to 10 kg per sq. cm. Water and fat were determined in the presscake; the press liquid was separated into oil, stickwater, and sludge, and these were analysed separately. Results are tabulated. It is concluded that, especially with raw material which is difficult to handle, the use of calcium chloride and formalin in cooking can result in better pressing, as shown by a lower water content in the presscake, a better yield of oil, and less loss of solids in the stickwater. Calcium chloride is more effective than an equal quantity of formalin, and increases the content of salts in the meal and stickwater. Nitrite did not appear to have any favourable effect and no definite results were obtained in the preliminary experiments with ferric chloride.

(The above abstract appears in Food Science Abstracts 25, No. 2, 145, March, 1953 and is reprinted here)

STABILITY OF TURKEY CARCASS FAT

UNKNOWN GROWTH FACTORS

UNIDENTIFIED GROWTH FACTORS

COAGULATING AGENTS IN FISH MEAL PRODUCTION

6.193

bles, alfalfa meal, and in lower and more variable concentration in soybean oil meal. At Illinois it has been concluded that there are three distinct factors; one in fish solubles, one in dried whey, and one in alfalfa meal.

Evidence obtained at Beltsville indicates that the factor in fish products is neither required for reproduction nor is it transmitted from dam to offspring. Maryland findings in studies with the liver factor, however, indicate that the factor is transmitted from dam to offspring, and it could mean the presence of a different factor. Breeding hens on a corn-vegetable protein diet at the laboratories of the Western Condensing Co. became depleted of an unknown factor required for growth of the progeny, whereas depletion was prevented in similar hens by supplying 4 percent of fish solubles and 4 percent of dried whey. These circumstances made it impossible to say whether the fish factor or the whey factor or both were depleted.

To summarize, the unknown factor of fish and meat byproducts is not supplied in measurable quantities by grains and soybean oil meal. It is supplied, however, by fish meal, fish solubles, and meat meal; consequently, these products are regarded as something more than protein-vitamin B_{12} supplements. The unknown factor is required for rapid growth regardless of the presence of an antibiotic or an arsenical. It is needed more by a fast-growing broiler strain than by a slow-growing strain of chickens. And finally, its effect extends over at least the first ten weeks of life.

4.99

After butchering, the carcass fats were analyzed, the saturated fatty acid and oleic acid contents were calculated, and the stability of the carcass fat was determined. These findings indicated that the linoleic and linolenic acid content of the carcass fat was a function of the dietary levels of these fatty acids. For example, dietary fats containing 35-42 and 23 or less percent linoleic acid produced carcass fats containing 13-15 and 3-6 percent linoleic acid, respectively. The oleic acid content of the carcass fat, which in the analysis used also included hexadecenoic acid, remained essentially independent of the dietary fat and ranged between 46 and 63 percent of the total fatty acid composition. Similarly, the saturated fatty acid content of the carcass fat ranged between 28 and 30 percent of the total fatty acids, despite the rather wide variation in dietary fats. Carcass fats in the group that received no additional dietary fat (ration 1) and in the group that received 2 percent beef fat (ration 2) were almost identical. In general, however, the dietary fats at only a 2.5-percent level did influence the body fat composition of the turkey rather markedly.

Storage instability was directly related to the amount of unsaturated fatty acids in the carcass fats and came mainly from the linolenic acid fraction, except in the case of the ration containing linseed oil, where 5- and 6-double bond fatty acids were considered responsible. The different rations produced carcass fats having essentially 3 different levels of stability. Rations 1, 2, and 3 produced carcass fats of high stability; rations 6 and 7 produced carcass fats of moderate stability, and rations 4 and 5 (linseed and sardine oils) produced carcass fats of low stability.

After various periods of storage at 0°F, the eviscerated carcasses were evaluated for peroxides and aldehydes in the raw fat and for fishy and rancid off-flavors and odors in the roasted carcasses (A. A. Klose et al., Poultry Science 32, 82 (1953)). At the 2-percent dietary level, sardine oil (ration 5) produced intense fishiness, linseed oil (ration 4) produced moderate fishiness, and the commercial diet containing about 0.4 percent fish oil (ration 7) produced only slight fishy flavors in the roasted carcasses.

6.193

The use of methionine as a supplement in broiler and turkey feeds continues although the results of some of the trials have been negative. In most instances, however, the addition of 1/4 to 1/2 pound of methionine per ton of feed does improve feed efficiency. Dr. Couch and co-workers at Texas A and M attribute their good response with methionine supplementation in turkey rations to the presence of the unidentified factor in fish solubles. The lack of positive results with methionine supplementation in poult rations at the University of Maryland, however, may involve the types of rations used, environmental influences, the growth rate of the birds, etc.

2.114 PUMPING LIVE FISH SIMPLIFIES PROBLEM OF BAIT HANDLING ABOARD CLIPPER

Anonymous
Pacific Fisherman 51, No. 8, 55-57 (July, 1953)

A fish pump was recently installed aboard a California tuna clipper to transfer live bait from nets, receivers, and deep wells to the vessel's bait tanks. Although fish pumps have been used for years at many Southern California canneries, this was the first to be installed aboard a live-bait boat.

The pump requires no priming equipment. The column of fish and water are lifted by means of a vacuum. The manufacturer states that the fish are not damaged by being pushed or beaten by any fast-rotating impellers or moving pistons. The slowly revolving large rotary separator valve empties the fish into bait receivers, or the fish may be moved direct from the net to bait tank, or from one bait tank to another, never leaving water.

The intake of the pump is a 6-inch rubber hose. A 20-horsepower electric motor that is installed in a small space above the shaft alley drives the vacuum pump. A 3-horsepower gear motor is used on the pump above deck.

The distinctive feature of the pump, which is patented, is the rotary separator valve that separates fish and water from air. A suction chamber above the pump impellers keeps the fish away from the blades and spills them unharmed into the bait tank or hold of a boat.

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3.26 FACTORS AFFECTING PRICE OF FISH IN RELATION TO PRICE OF BEEF

Kahn, Richard A. (Economist, U. S. Fish and Wildlife Service)
Frosted Food Field XVI, No. 6, 4 (June, 1953)

Recent declines in beef prices have led many people in the food industry to fear that fish sales will drop as a result. The author feels that the fish industry, in accepting this opinion, is taking a defeatist attitude. He believes that "more aggressive promotion by the fish industry as well as better tailoring of the sales product to the consumer's wants will overcome any sales dip resulting from the steep fall in beef prices."

In an effort to determine what effect lower beef prices might have on fish consumption, Dr. Kahn made an analysis of what happened in past periods to fish consumption when beef prices also declined sharply. As a result of this analysis the following conclusions were reached:

1. In the past, when beef prices sagged, people often bought even more fish.
2. A great number of people eat fish for religious, racial, nutritional, or social reasons. These people will change their fish-eating habits only when an urgent reason, such as lower income, forces them to do so.
3. About 25 percent of the population readily shifts its food consumption from one item to another as influenced by price changes, taste of the product, attractiveness of packaging, and recommendation by friends.
4. If the products offered by the fish industry are of first-class quality, practical, attractively presented, and easy to serve, much of the population may

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2.3 INVENTOR CITES FEATURES OF NEW FILLET MACHINES

Anonymous
Quick Frozen Foods 15, No. 12, 71 (July, 1953)

A new filleting machine developed by a New England consulting engineer is said to be capable of processing fish ranging in size from approximately one-third pound to three pounds, and of producing smooth fillets that are virtually free from bone, fins and black skin, regardless of whether the fish to be processed are perfect or mutilated.

The machine will process an average of 15,000 pounds of round fish a day. The fish are headed on a separate heading machine operated by two workers and then fed into the filleting machine by a single operator. One of the secrets of the machine's success is the use of special stainless steel knives with long-life cutting edges.

By eliminating the wooden hand cutting board, fillets are produced having a much lower bacteria count.

It is claimed that a 10 percent higher yield is obtained with machine filleting, largely due to a wider cut at the nape.

8.50 FLUCTUATIONS IN THE CONTENT OF WATER AND FAT IN THE COD

Bogucki, M. and Trzesinski, P.
Biul. Morsk. Inst. Ryback., No. 5, 25-30 (1950)

The concentration of water in cod flesh is highest (83.5%) from May to September, and lowest (80.7%) during the rest of the year. The fat content of the muscles varies between 0.034 and 0.45%. The highest fat content in the liver is found during the period which precedes spawning; it decreases during the period following spawning (June to September). In the cod liver there is about 36 times more fat than in the rest of the flesh.

CHEMICAL COMPOSITION OF THE BALTIC COD AND HERRING IN RELATION TO THE DEGREE OF SEXUAL MATURITY

Kordyl, E.
Prace Morsk. Inst. Ryback., No. 6, 145-157 (1951)

A series of investigations was carried out on the Baltic cod and herring to determine the changes which occur in the chemical composition of these fish during the various phases of the yearly cycle and sexual maturation. The flesh of cod had a low water content during the period October to April (80.59 to 81.43%), but high protein (17.02 to 17.97%) and ash (1.10 to 1.26%) contents; during the same period, the liver contained 51.47 to 67.10% of fat. Later in the year, from April to July, the water content of the cod flesh increased, but the protein, ash, and liver fat contents decreased. On the whole, the female cod had a higher content of water in the flesh, and less fat in the liver, than the

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(The above abstracts appear in Food Science Abstracts 25, No. 2, 154, March, 1953 and are reprinted here)

LIVE-BAIT PUMP FOR TUNA VESSELS

NEW FILLETING MACHINE

FISH VS. BEEF PRICES AND CONSUMPTION

SEASONAL CHANGES IN COMPOSITION OF COD

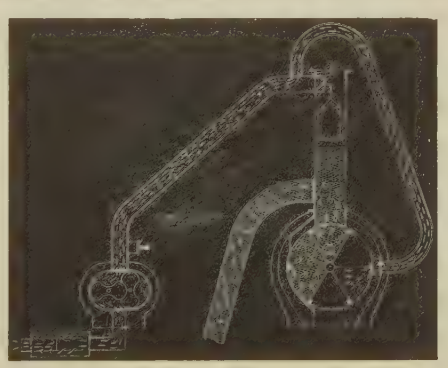
2.3 (Cross Reference: 3.230)

8.50 (Cross References: 8.43, 1.5, 1.2)

male. In herring, the highest water and the lowest fat content were found in May, and the reverse was the case towards the end of January.

2.114 (Cross Reference: 2.1127)

It is stated that 100,000 small fish can be stowed away in 15 minutes without any effort. By hand the job would take two hours. Whereas the loss of fish by the dip net method is 20 to 25 percent, that experienced with the pump is said to be negligible.



3.26

boost the quantity of fish it eats, even in times of recession.

5. The meat industry provides an example of how a branch of the food industry has been spurred by adapting its merchandising program to market changes. The promotion of canned meats has put these products on the tables of the 5,000,000 persons living alone as well as in the households of the 19,000,000 working women who don't have the time to spend long hours in the kitchen.
6. Another trend in recent years has been the growing demand for smaller food packages on the part of older people. Frozen fish in small-size units will appeal to this segment of the population.
7. Ready-to-serve frozen fish products, offered in smaller packages, can easily balance any small decreases in fish consumption that may result from lower beef prices.

Dr. Kahn presents comparative consumption and price data in six tables.

0.38 STUDIES ON THE CATALASE IN MARINE ALGAE. PART I. ON THE CATALASE ACTIVITY IN MARINE ALGAE

Takagi, Mitsuzo
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 483 (1953)
(English summary and tables)

Catalase activity is strongest in Monostroma angicaba and Popphyra pseudolinearis.

0.38 ENZYME INACTIVATION

Watts, Johnnie and Griswold, Ruth M.
Journal of Agricultural and Food Chemistry 1, No. 8, 569 (July 8, 1953)

0.38 THIAMINASE IN AQUATIC ANIMALS OF NOVA SCOTIA

Neilands, J. B.
Journal of the Fisheries Research Board of Canada VII, No. 2, 94-99 (May, 1947)

(Abstract of this article appears under 5.2 page 17 - August, 1953 issue)

1.0111 FISHERIES BY-PRODUCTS

PART ONE -- THE WEST COAST
Rosenberg, Sydney M.
PART TWO -- THE MARITIMES AND QUEBEC
Cunningham, Andrew
PART THREE -- NEWFOUNDLAND
Young, F. Ross
Canadian Fisheries Annual for 1953, p. 85

1.0111 CANADA'S LAKE TROUT

Anonymous
Trade News 5, No. 9, 8 (March, 1953)

(Abstract of this article appears under 1.37 page 13 - July, 1953 issue)

1.0111 FAR-REACHING PROJECTS WILL MODERNIZE AND BENEFIT NEWFOUNDLAND'S SALT COD FISHERY

Anonymous
Canadian Fisheries Annual for 1953, p. 83

2.01 STUDIES ON THE ACTION OF FISH COMPONENTS -- III. THE ANTIBIOTIC ACTION OF METHYL ESTERS OF UNSATURATED FATTY ACIDS

Tomiyasu, Yukio and Toyomizu, Masamichi
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 12, 683 (1953)
(English summary and tables)

The antibiotic action of methyl esters was produced spontaneously with the lapse of time, that is, without the addition of cupric sulfate, and the activity was proportional to the number of the double bonds.

2.02 THE SHORTENING OF RABBIT MUSCLES DURING RIGOR MORTIS; ITS RELATION TO THE BREAKDOWN OF ADENOSINE TRIPHOSPHATE AND CREATINE PHOSPHATE AND TO MUSCULAR CONTRACTION

Bendall J. R.
J. Physiol. 114, 71-88 (1951)
Food Science Abstracts 25, No. 3, 253 (May, 1953)

2.05 SHELL-FISH FOR HUMAN CONSUMPTION. PART II

Dewberry, Elliot B.
Food Manufacture 28, No. 4, 149-151 (April, 1953)

(Abstract of this article appears under 2.2 page 17 - July, 1953 issue)

2.1120 STUDY ON THE NETTING CORD. ON THE PROPERTIES OF SYNTHETIC-FIBER-I

Fukazawa, Fumio and Masuzaki, Kenji
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 472 (1953)
(English summary and figures)

2.1121 MODEL EXPERIMENTS ON A TESIO-HIKIAMI (TRAWL NET)

Koike, Atsushi
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 1, 8 (1953)
(English summary, table, and figures)

2.1121 WHAT ACTUALLY HAPPENS WITH TRAWL NET IN ACTION

Anonymous
Fishing Gazette 70, No. 6, 84 (June, 1953)

2.1127 PUMPING LIVE FISH SIMPLIFIES PROBLEM OF BAIT HANDLING ABOARD CLIPPER

Anonymous
Pacific Fisherman 51, No. 8, 55-57 (July, 1953)

(Abstract of this article appears under 2.114 page 19)

3.238 PLASTICS PROPERTIES AT LOW TEMPERATURES

Yarsley, V. E. and Ives, G. C.
World Refrigeration 4, No. 4, 193-203 (April, 1953)

3.238 ANTIOXIDANTS IN PACKAGING FILM PROTECTS CONTENTS

Anonymous
Food Processing 14, No. 6, 31-32 (June, 1953)

(Abstract of this article appears under 4.64 page 11 - August, 1953 issue)

3.238 CONTROL OF RANCIDITY IN FISH FLESH. II. PHYSICAL AND CHEMICAL METHODS

Tarr, H. L. A.
Journal of the Fisheries Research Board of Canada II, No. 5, 237-247 (August, 1948)

(Abstract of this article appears under 3.249 page 17 - August, 1953 issue)

4.21 STUDIES ON A KIND OF DISCOLORATION OF FISH OIL -- VII.

Nonaka, Junsaku
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 11, 653 (1953)
(English summary and table)

"When the fish oil is submitted to the oxidation with air for 30-60 minutes at 90°C. and then treated with ammonia, 'Rusting' occurs. The fatty acids which have the relation to the occurrence of the rusting are not only the higher unsaturated fatty acids, but also the other saturated and the lower unsaturated fatty acids."

4.21 STUDIES ON THE ANTIBIOTIC ACTION OF FISH COMPONENTS (PART VI). PRODUCTION OF THE ANTIBIOTIC ACTION BY THE OXIDATION OF FISH OILS

Tomiyasu, Yukio; Toyomizu, Masamichi; and Takahashi, Kikuo
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 531 (1953)
(English summary, tables and figures)

4.21 APPLICATION OF TRACER TECHNIQUES TO STUDIES ON AUTOXIDATION REACTIONS

Khan, N. A.
Journal of the American Oil Chemists" Society 30, No. 7, 273 (July, 1953)

4.21 THE MECHANISM OF THE OXIDATION OF UNSATURATED FATTY ACIDS CATALYZED BY HEMATIN COMPOUNDS

Tappel, A. L.
Archives of Biochemistry & Biophysics 44, No. 2, 378 (June, 1953)

6.132 SMALL SCALE MANUFACTURE OF FISH MEAL

Sparre, T.
FAO Fisheries Bulletin 6, Nos. 1-2, 1 (January/February - March/April, 1953)

6.134 VITAMINS IN STICKWATER

Anonymous
Meld. S.S.F., No. 4, 77-82 (1951)
Food Science Abstracts 25, No. 2, 147 (March, 1953)

(Abstract of this article appears under 6.134 page 15)

6.139 HOW DO DRYING METHODS INFLUENCE THE NUTRITIVE VALUE OF THE PROTEIN IN HERRING MEAL?

Anonymous
Meld. S.S.F., No. 12, 6-10 (1950)
Food Science Abstracts 25, No. 1, 22 (January, 1953)

Preliminary work is reported. Herring meal, which had been dried by (1) combustion-gas, (2) steam, and (3) hot air and steam, was analyzed. In feeding experiments, the meals were used to supplement a low protein diet for chicks. The effect of the drying method on the nutritive value of herring meal protein can only be determined when meal from the same raw material is prepared simultaneously in different dryers. Results indicated, however, that no great damage to the protein would be caused by unfavorable drying conditions.

6.192 AUREOMYCIN-VITAMIN B_{12} -- INFLUENCE ON GROWTH, MOISTURE, FAT, AND NITROGEN CONTENT

Mirone, Leonora (University of Georgia, Athens)
Journal of Agricultural and Food Chemistry 1, No. 7, 519 (June 24, 1953)

6.193 UNIDENTIFIED FACTORS AND FISH PRODUCTS

Combs, G. F.
Fish Meal & Oil Industry Yearbook 5, No. 5, 17 (March 31, 1953)

6.195 THE PROBLEM OF HEAT INJURY TO DIETARY PROTEIN

Frazier, L. E.; Cannon, P. R.; and Hughes, R. H.
Food Research 18, No. 2, 91-103 (March-April, 1953)

(Abstract of this article appears under 6.139 page 3 - July, 1953 issue)

6.195 LACK OF EFFECT OF AMINO ACIDS ON THE GROWTH RETARDATION DUE TO UNHEATED SOYBEANS

Hill, C. H.; Borchers, R.; Ackerson, C. W.; and Mussehl, F. E. (University of Nebraska)
Archives of Biochemistry & Biophysics 43, No. 2, 286 (April, 1953)

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
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Chemistry and Industry
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Drug and Cosmetic Industry
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Fisheries Newsletter (Australia)
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Flour and Feed
Food Engineering
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Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Technology
Foreign Commerce Weekly
Frosted Food Field
Gourmet
Ice and Refrigeration
Industrial and Engineering Chemistry
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Canner and Packer
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

6.54 CAMBRIDGE SCIENTISTS SEEK BETTER UTILIZATION OF WHALE MEAT

Anonymous
Chemical and Engineering News 31, No. 24, 2510 (June 15, 1953)

(Abstract of this article appears under 1.95 page 7)

6.55 LIQUID FERTILIZERS LEAD IN NEW APPLICATIONS OF FISH BY-PRODUCTS

Anonymous
Journal of Agricultural and Food Chemistry 1, No. 3, 206-207 (April 29, 1953)

(Abstract of this article appears under 6.55 page 7 - July, 1953 issue)

6.59 THE LIQUID ENSILAGE OF FISH FOR ANIMAL FEEDING-STUFFS

Hanson, S. W. F. and Lovern, J. A.
Fish. News, No. 1988, 11 (1951)
Food Science Abstracts 25, No. 1, 16 (January, 1953)

6.59 THE HYDROLYSIS OF THE PROTEINS IN FISH SILAGE

Petersen, Af Halvor
Reports from the Fishery Minister's Research Laboratory, Copenhagen, December, 1952
(English summary)

Hydrolysis of proteins apparently does not reduce the nutritive value of fish silage.

7.53 THE LIPIDS OF FISH. 1. CONTENT AND CONDITION OF LIPIDS IN THE FLESH OF THE HADDOCK (GADUS AEGLEFINUS)

Lovern, J. A.
Biochemical Journal 54, No. 1, 126 (April, 1953)

(Abstract of this article appears under 8.53 page 9 - August, 1953 issue)

7.53 QUALITATIVE CHROMATOGRAPHY OF LONG-CHAIN FATTY-ACIDS

Baker, R. G.
Biochemical Journal 54, No. 4, xxxix (July, 1953)

7.53 STUDIES ON THE CUTTLE-FISH OIL -- I.

Tsujino, Isami; Nakamura, Yukihiko; and Ishihara, Yoshio
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 503 (1953)
(English summary and tables)

The free fatty acids are easily distilled out quantitatively as methyl esters from the partially methyl esterified dark oils.

8.51 THE NON-PROTEIN NITROGENOUS CONSTITUENTS OF FISH AND LOBSTER MUSCLE

Campbell, James
Journal of the Biological Board of Canada 1, No. 3, 179-189 (January-February, 1935)

(Abstract of this article appears under 8.59 page 19 - August, 1953 issue)

8.51 BIOCHEMICAL STUDIES ON SKIPJACK (KATSUWONUS VAGANS) -- III. ON THE NITROGEN COMPOUNDS IN SKIPJACK PYLORIC COECA EXTRACT

Kashiwada, Ken-ichi; Katimoto, Daiichi; and Yamasaki, Toshimori
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 1, 15 (1953)
(English summary and tables)

Main component of the HCl hydrolysis extract was not protein, but peptone, sub-peptone and polypeptide.

8.51 STRUCTURE OF MUSCLE. II. ARTHROPOD MUSCLES

Farrant, J. L. and Mercer, E. H.
Exptl. Cell Research 3, 553-63 (1952); Austr. J. Exptl. Biol. Med. 27, 465 (1949)
Chemical Abstracts 47, No. 3, 1298 (1953)

Single isolated filaments of crab muscle seemed to consist of a core of 1 protein (actin?) enveloped by a 2nd protein (myosin?).

8.53 STUDIES ON THE WHALE OIL - VII. FATTY ACIDS COMPOSITION OF THE BOTTLE-NOSE WHALE OIL. PART I. ON THE HEAD AND JAW OIL

Saiki, Masamichi
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 497 (1953)
(English summary, tables, and figure)

The mixed fatty acids consisted of large quantities of saturated fatty acids (68.84%) which were constituted chiefly of lauric and capric acids, small quantities of myristic and palmitic acids and a slight quantity of stearic acid. Almost all of the unsaturated fatty acids were constituted of monoethenoid acids of C_{18}, C_{16}, C_{20}, C_{12}, C_{14}.

8.53 ON THE GLYCERIDE COMPOSITION OF ANIMAL FATS

Quimby, O. T.; Wille, R. L.; and Lutton, E. S.
Journal of the American Oil Chemists' Society 30, No. 5, 186 (May, 1953)

8.53 RELATION BETWEEN RED PIGMENT-COMPONENTS IN VISCERA-OILS OF THE POLLACK AND ASTACENE OF CRUSTACEA

Nakamura, Yukihiko; Ishihara, Yoshio; and Nishibori, Kokichi
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 10, 488 (1953)
(English summary, tables, and figures)

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INDEX

Subject	Page No.	Card No.
Analysis, general		
Organoleptic assessment of spoilage	9	7.80
Analysis, organic		
Analytical oil extraction from fish meal	9	7.53
Determination of freshness of fish	9	7.80
Lipids of haddock	13	8.53
Muscle shortening versus ADT breakdown	21	2.02
Qualitative fatty acid analysis	25	7.53
Esterified cuttle-fish oil fatty acids	25	7.53
Apparatus and equipment, laboratory and plant		
Use of ozone in odor control	5	6.135
Portable dock	7	2.2
Corrosion resistance of metallic coatings	11	2.113
Mechanized breading of oysters	11	3.231
Rust inhibitor for salt and salt brines	15	2.113
New filleting machine	19	2.3
By-products, miscellaneous		
Liquid ensilage of fish	25	6.59
Hydrolysis of proteins in fish silage	25	6.59
Chemistry and biochemistry, miscellaneous		
Electrodialysis of suspensions	3	0.30
Pigments from marine "red water"	3	0.34
Enzymic reduction of "onium" salts	3	0.38
Catalase activity in marine algae	21	0.38
Inactivation of enzymes	21	0.38
Cod family		
Seasonal changes in composition of cod	19	8.50
Composition, organic		
Lipids of haddock	13	8.53
Lipids of haddock	13	8.53
Seasonal changes in composition of cod	19	8.50
Components of skipjack pyloric coeca extract	25	8.51
Composition of crab muscle	25	8.51
Fatty acid composition of whale oil	25	8.53
Glyceride composition of animal fats	25	8.53
Astacene and pigmented pollack oils	25	8.53
Composition, vitamins		
Composition of salps	13	8.6170
Composition of whale liver oils	13	8.6179
Vitamins in stickwater	15	8.64
Equipment, fishing vessel		
Corrosion resistance of metallic coatings	11	2.113
Corrosion resistance of metals	15	2.113
Rust inhibitor for salt and salt brines	15	2.113
Live-bait pump for tuna vessels	19	2.114
Fish meal, nutritive value		
Fishery products in animal feeds	5	6.190
Unidentified growth factors	17	6.193
Unidentified factors and fish products	23	6.193
Fish meal and oil, manufacture		
Drying method vs. meal quality	5	6.139
Vitamins in stickwater	15	8.64
Coagulating agents in fish meal production	17	6.132
Small scale manufacture of fish meal	23	6.132
Drying method vs. nutritive value of meal	23	6.139
Freshness of fish		
Determination of freshness of fish	9	7.80
Frozen fish, general		
Frozen seafood specialties	1	3.230
Frozen fish, changes in during freezing and cold storage		
Study of contracture caused by thawing	1	3.239
Frozen fish, packaging		
Properties of plastics at low temperatures	23	3.238
Frozen fish, processing		
New fish processing plant	11	3.230
Mechanized breading of oysters	11	3.231
Glazing brine-frozen salmon	15	3.24
Gear, fishing		
Trolling paravane	11	2.1122
Synthetic fiber in fish netting	21	2.1120
Model trawl net experiments	21	2.1121
Trawl action studies	21	2.1121
Marine plant products		
Electrodialysis of suspensions	3	0.30
Drying of seaweed	5	6.3
Marketing		
Fish vs. beef prices and consumption	19	3.26
North America, Canadian fisheries		
Canada's fresh-water fisheries	7	1.0111
Canadian fisheries byproducts	21	1.0111
Newfoundland salt cod industry	21	1.0111
Nutrition and medicine, general		
Amino-acid requirements	3	0.7
Unknown growth factors	17	6.193
Amino-acid nutrition	23	6.195
Oils, chemical and physical properties		
Oxidation of oils and fats	1	4.21
Lipids of haddock	13	8.53
Autoxidation reaction studies	23	4.21
Antibiotic from oxidized fish oil	23	4.21
Rusting discoloration of fish oil	23	4.21
Hematin catalyzed oxidation of fatty acids	23	4.21
Oils, nutrition		
Fish oils in poultry feeds	1	4.90
Stability of turkey carcass fats	17	4.99
Oysters		
Mechanized breading of oysters	11	3.231
Preservatives and sanitation		
Use of ozone in odor control	5	6.135
Shellfish and crustaceans, miscellaneous		
Composition of salps	13	8.6170
Spoilage		
Enzymic reduction of trimethylamine oxide	7	2.00
Determination of freshness of fish	9	7.80
Antibiotic action of fatty acid methyl esters	21	2.01
Tuna		
Live-bait pump for tuna vessels	19	2.114
Vitamins, B-complex, miscellaneous		
Enzymic reduction of "onium" salts	3	0.38
Vitamins, vitamin B_{12} and protein utilization factor(s)		
Unknown growth factors	17	6.193
Unidentified growth factors	17	6.193
Role of vitamin B_{12} in nutrition	23	6.192
Vitamins, miscellaneous		
New form of vitamin D	9	5.6
Whales and other marine mammals		
Utilization of whale meat	7	1.95
Composition of whale liver oil	13	8.6179

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